

REVIEW OF INSECT DIVERSITY IN SILAPATHAR, DHEMAJI, ASSAM

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ABSTRACT

*Insects fabricate the biological foundation for all terrestrial ecosystems. The current chunk of work is based on an investigation conducted in paddy fields and agricultural lands of a city of Dhemaji district, Assam which is named as Silapathar. The root behind our survey was to explore the entomological enrichment of Silapathar. During the investigation, insect samples were collected on a daily basis for a prolonged period of one month. The collection was done twice a day both during the morning and evening for 2hrs. Later collected insects were identified based on their physiological characteristics. The life cycle stages of some insects were also studied. The insect varieties which were identified in Silapathar included 8 species belonging to kingdom Animalia, phylum Arthropoda, class Insecta ; 3 species from order Orthoptera, 1 from order Hymenoptera, 4 from order Hemiptera. Among the identified insects in Silapathar were *Tettigonia viridissima* (Great green bush cricket), Lesser marsh grasshopper, *Velarifictorus micado* (Japanese burrowing cricket), *Nezara viridula* (Southern green stink bug), *Vespa mandarinia* (Asian giant harnet), *Rhyparochromus vulgaris* (seed bug), *Leptocoris oratorius* (Rice ear bug), *Oncocephalus* (Assassin bug). Data let out that Silapathar is highly enriched with different types of insects and there is more to explore about this place.*

KEYWORDS: *Insects Diversity, Bugs, Silpathar & Assam*

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1. INTRODUCTION

Globally speaking, approximately three-fourths of all the species of animals found in nature are insects (Majumder *et al*, 2013). They have been familiar with their versatile contribution to the ecosystem playing the role of pollinators, parasites, predators, decomposers, cycling nutrition, medicinal resources, commercial significance, influence on agriculture, etc. (Weisser and Seimann, 2004). Several tribal communities of North-East India are renowned for their inclusion of insects (crickets, beetles, bees, wasps, grasshoppers, etc.) in traditional diets for their nutritional, economic and ecological benefits(Lundquist and Zhu, 2018).

Assam is popular as a biological hotspot with unnumerable rare endemic plants and animal species. One-horned rhinoceros, wild water buffalo, swamp deer, dolhirina (*Cervus duvauceli duvauceli*), clouded leopard (*Neofelis nebulosa*), nol-gahori (*Porcula salvania*), golden cat, blue throated barbet, white winged wood duck are some faunal species which give Assam a place among the other enriched countries from the biodiversity point of view (Neog and Rajkhowa, 2016). Whenever talking about Assam we can't forget to talk about insects, as insects capture a remarkable place in its biodiversity. Insects like crickets, bees, wasps, grasshoppers, locusts, etc. are traditional food for many assamese tribal communities (Montgomery *et al*, 2020). The contribution of eri (*Philosomia ricini*) and muga (*Antheraea assama*) silk worm reminds us how insects contribute to the state's

economy.

Keeping in mind the necessity of insect diversity, a faunal inspection was initiated in Silapathar, Dhemaji district, Assam in order to explore the insect population over there as very negligible reports have been found about the entomological diversities of Silapathar.

SILAPATHAR (LOCATION, CONSTITUTION AND AREA)

Silapathar, a beautiful city in the Dhemaji district is located at the northern bank of the Bramhaputra river. It is 470 kms from Guwahati and just 6 kms from the border of Arunachal Pradesh.

Longitude - 94.8324

Latitude - 27.53293

Humidity - 74.3% and

Altitude/Elevation - 117.00m/383.86ft.



Figure 1: Geographical Location of Silapathar.

Silapathar has a humid, subtropical, dry winter climate. Annual temperature remains approx. 25.49 degree celcius. The longest rail cum road bridge in India that connects Silapathar to Dibrugarh is Bogi Beel bridge.

2. MATERIALS AND METHODOLOGY

Insects were collected on a daily basis for one month. The collection was done twice a day both during the morning (7-9 am) and evening (5-7 am) for 2hrs approx. Insect catching net was used for collection of insects followed by hand picking. After collection, collected samples were killed by vapour of killing agents and carefully brought to the laboratory and stored in 70% alcohol. Later based on appropriate physiological characteristics identification procedure was undergone (Neog and Rajkhowa, 2016).

For catching insects at night, Light Trap method was applied (Reissing *et al*, 1986) for the collection of different types of nocturnal flying insects like bugs, worms, stemborers, leafhoppers, etc. Light Trap is a device used for catching nocturnal insects who roam in open places.

Materials used for Making Light Trap

- Bamboo/wooden poles,
- String/rope,
- Kerosine lamp/electric blub,
- Basin full of water/ jute sack.



Figure 2: Light Trap.

Methodology for using Light Trap

- A light trap was installed near the survey area. The poles of the trap were firmly set on the ground.
- The bulb was mounted on the trap frame which was 5mtrs from the ground. To avoid electrocution, proper care was taken while using electric bulb.
- Next, the jute sack was carefully set under the light chamber.
- The device was left overnight and trapped insects were collected in the morning.

3. RESULTS

Table 1: Tabular Representation of Various Species Identified in Silapathar (Dhemaji) along with their Scientific Classification

S N.	Name of Species	Scientific Classification						
		Kingdom	Phylum	Class	Order	Family	Genus	Species
1	<i>Tettigonia viridissima</i> (Great green bush cricket)	Animalia	Arthropoda	Insecta	Orthoptera	Tettigoniidae	<i>Tettigonia</i>	<i>viridissima</i>
2	Lesser marsh grasshopper	Animalia	Arthropoda	Insecta	Orthoptera	Acrididae	<i>Chorthippus</i>	<i>albomarginatus</i>
3	<i>Velarifictorus micado</i> (japanese burrowing cricket)	Animalia	Arthropoda	Insecta	Orthoptera	Gryllidae	<i>Velaifictorus</i>	<i>micado</i>
4	<i>Nezara viridula</i> (southern green stink bug)	Animalia	Arthropoda	Insecta	Hemiptera	Pentatomidae	<i>Nezara</i>	<i>viridula</i>
5	<i>Vespa mandarinia</i> (asian giant harnet)	Animalia	Arthropoda	Insecta	Hymenoptera	Vespidae	<i>Vespa</i>	<i>mandarinia</i>
6	<i>Rhyparochromus vulgaris</i> (seed bug)	Animalia	Arthropoda	Insecta	Hemiptera	Rhyparochromidae	<i>Rhyparochromus</i>	<i>vulgaris</i>
7	<i>Leptocoris a oratorius</i> (Rice ear bug)	Animalia	Arthropoda	Insecta	Hemiptera	Alydidae	<i>Leptocoris</i>	<i>oratorius</i>
8	<i>Oncocephalus</i> (Assassin bug)	Animalia	Arthropoda	Insecta	Hemiptera	Reduviidae	<i>Oncocephalus</i>	--

Table 2: Tabular Representation of Characteristic Features Observed in *Tettigonia Viridissima* (Great Green Bush Cricket) and Lesser Marsh Grasshopper

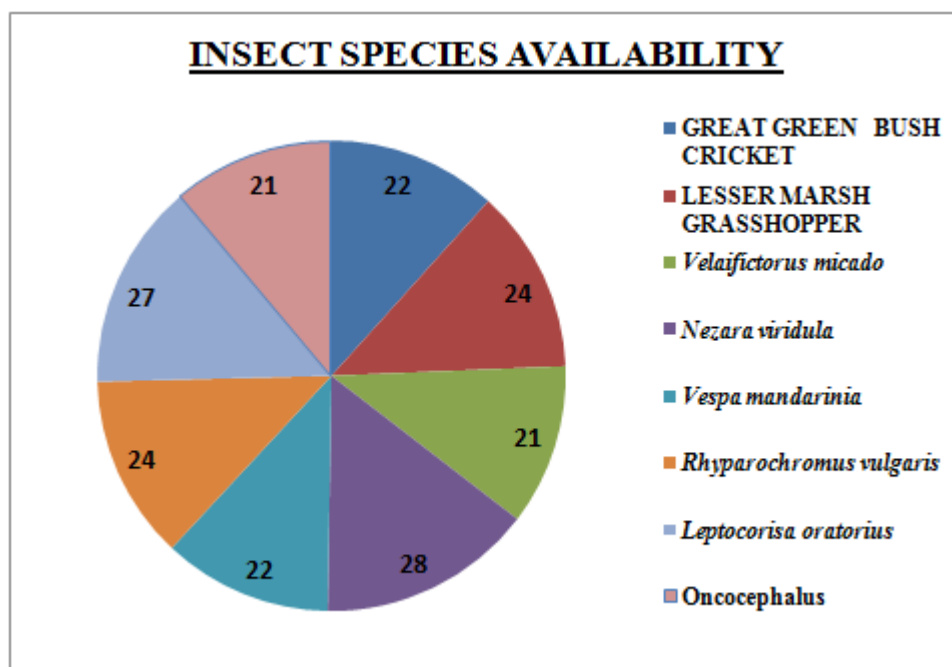
Sl No.	Characteristics	Name of Species	
		<i>Tettigonia Viridissima</i> (great Green) Bush Cricket	Lesser Marsh Grasshopper
1	Structural Features	(i) Body 7cm long with long wings, keel shape on the pronotum (on the thorax segment) ; (ii) Difference between males and females include absence or presence of ovipositor, size, wings length, colour, antennae, body length	(i) 2 colour forms, straw brown or light green. (ii) They have a pointed snout, parallel ridges or keels behind the head and long wings as adults. (iii) Males are 15mm in length and females are larger around 20 mm in length often with white wings border.
2	Habitat	Grasslands, meadoues, prairies.	Damp marshy and drier grassland habitats.
3	Feeding Habit	Trees, grassland dotted with patches of scrub, Eat vegetation and other Insects.	Feed on several types of grass species, favour green leaves.
4	Availability	22	24

Table 3: Tabular Representation of Characteristic Features Observed in *Velarifictorus Micado*, *Nezara Viridula* and *Vespa Mandarinia*

Sl No.	Characteristics	Name of Species		
		<i>Velarifictorus Micado</i> (Japanese Burrowing Cricket)	<i>Nezara Viridula</i> (Southern Green Stink Bug)	<i>Vespa mandarinia</i> (Asian Giant Harnet)
1	Habitat	They are observed in grassy areas, also grassy edges of fields, woods and wetlands and suburban habitats.	Found in Orchards, gardens and farms.	Found in Dense woodland, low mountains and forest area. Also found in agricultural fields.
2	Feeding Habit	Omnivorous	Food plants comprises of all kinds of fruits, ornamental plants, field crops, vegetables, etc.	Basically omnivore in nature, feeds on tree sap, like oaks, etc. Workers were found to feed on beetles.
3	Availability	21	28	22

Table 4: Tabular Representation of Characteristic Features Observed in *Rhyparochromus vulgaris*, *Leptocoris* *Oratorius* and *Oncocephalus*

Sl No.	Characteristics	Name of Species		
		<i>Rhyparochromus Vulgaris</i> (seed bug)	<i>Leptocoris Oratorius</i> (Rice ear bug)	<i>Oncocephalus</i> (Assassin bug)
1	Structural Features	(i) <i>Rhyparochromus vulgaris</i> are small and generally brown or mottled. The fore femora are often enlarged (ii) These are dirt coloured seed bugs.	(i) Body is slender, around 2 cm long, with legs elongated and possess a long proboscis. (ii) Colour is yellowish brown.	(i) Their size ranges from 0.5 to 2 inches. (ii) Assassin bugs are black / dark brown/ brightly coloured. (iii) This bug has been observed to use its beak to pierce its prey for sucking its body fluids.
2	Habitat	Found on ground and in tree trunks, tends to roam around human habitats which may be in search of shelter.	Rice plant	Terrestrial plants, gardens and landscapes, etc.
3	Feeding Habit	Various seeds	Feeds on the sap of stems and rice seeds.	Feeds on insects caterpillars, larvae of leaf beetles, sawflies and nymphs of true bugs.
4	Availability	24	27	21

**Figure 3: Graphical Representation of Insect Species Identified in Silapathar (Dhemaji).**



Vespa Mandarin (Asian Giant Harnet) *Velaifictorus micado* (Japanese Burrowing Cricket)



Nezara Viridula (Southern Green Stink Bug) *Oncocephalus* (Assassin bug)



Leptocoris Oratorius (Rice ear bug) Lesser Marsh Grasshopper



Rhyparochromus vulgaris (Seed bug) *Tettigonia viridissima* (Great Green Bush Cricket)

Figure 4: Pictorial Representation of Collected Insect Species.

4. DISCUSSION

During our survey, 8 species of insects were identified, listed and documented in Silapathar which belongs to kingdom Animalia, phylum Arthropoda, class Insecta. Among the 8 identified species, 3 were from order Orthoptera, 1 from order Hymenoptera, 4 from order Hemiptera. The identified species were *Tettigonia viridissima* (Great green bush cricket), Lesser marsh grasshopper, *Velaifictorus micado* (Japanese burrowing cricket), *Nezara viridula* (Southern green stink bug), *Vespa mandarinia* (Asian giant harnet), *Rhyparochromus vulgaris* (seed bug), *Leptocoris oratorius* (Rice ear bug), *Oncocephalus* (Assassin bug).

(1) *Tettigonia Viridissima* (Great Green Bush Cricket)

Distribution and Habitat

This species has been reported in most of Europe, in Eastern realms, in East and North Africa. It is also found in Central Asia. It mostly appears in light dry soil.

Description

This insect is completely green. They possess rust colored band on top of the body (Kaud and Sharma, 2017). Legs are yellow in colour. It is distinguished by its very long and thin antenna which may reach upto 3 times the length of the body and it differentiates them from grasshopper who is very short. The Female has an egg laying organ that reaches a length of 21mm to 28mm. The larva are found to be green. The adult male grows upto 27mm to 30mm long while female reads 3mm to 40mm. (Abou *et al*, 2021).

Biology

Tettigonia viridissima is carnivorous and arboreal. Its diet includes flies, caterpillars and larva, etc. It is active during day and night as well.

(2) Lesser Marsh Grasshopper

Distribution

The lesser marsh grasshopper ranges from Finland and Southern Scandinavia in the north to Spain in Italy in the south.

Life Cycle

Nymphs of lesser marsh grasshopper have been observed to hatch in May and moulting continues until attaining maturity almost up to early July. Females were found to lay eggs at the base of the grass and eggs hatch in the following spring (Harvey *et al*, 2020).

Structure

This grasshopper has 2 color forms brown or light green. They have pointed sweet keral reason for heels behind the head and long wings as a result males are 15mm in length and females are larger at around 20mm in length.

Food Habit

They are not particularly selective about what they eat but they often prefer evergreen leaves.

(3) *Velarifictorus Micado* (Japanese Burrowing Cricket)

Distribution

It is distributed in different regions of Japan, Korea, China, Taiwan, and the Indochina Peninsula. *V.micado* is native to Asia and was first observed in the United States in 1995 in the district of Columbia. (Mohamed *et al*, 2021).

Description

The Japanese Burrowing Cricket (*Velarifictorus micado*) is a small, dark brown field cricket (13 to 19 mm long) with a head that is not much wider than the pronotum. Head width varied between the sexes. Females are found heavier than males. The colour of *Velarifictorus micado* are yellowish brown and have 7 or less elongated stripes from the head to the front margin of the pronotum (Sharma and Das, 2018).

Biology

Before reaching adulthood, *Velarifictorus micado* undergo several molts. The molting stages are biologically termed as instars and these crickets have been observed to run through 4 instars. In research, it has been found that in Asia, this insect prefers wet grassy wooded or partially wooded (Narzari and Sarmah, 2015).

(4) *Nezara viridula* (Southern Green Stink Bug)

Distribution and Habitat

N. viridula is approximately found worldwide. This species occurs throughout the tropical, subtropical and warm temperate regions of Africa, Australia, Europe, Asia (India, Bangladesh, Myanmar, Taiwan, etc.), etc. They are diurnal and mostly found in vegetable farms.

Food Habit

Hosts crops are beans, cabbage, chinese cabbage, citrus, crucifers, green beans, head cabbage, macadamia nuts, mango, mustard cabbage, orchids, peppers, potatoes, soybeans, tomatoes etc (Narzari and Sarmah, 2015).

Life Cycle

Nezara viridula have 5 larval stages and the adult stage as its developmental stages. The duration of the cycle is approximately 3 weeks.

Eggs

The eggs are around 1/20 of an inch long and 1/29 inch wide. Time of incubation is 5 days in the summer and 2-3 weeks during early spring. With continuation of incubation, the eggs turn pinkish in color (Mohamed *et al*, 2021).

Adult

With a naked eye view, the adult *Nezara viridula* appears like a shield and color is dull green where as the eye color is dark red or black. When observed closely, small black dots can be found on the abdomen. The females (approx 13mm) are larger than males (approx 12mm). The females have been seen to lay eggs in masses. Eggs seem to be attached with each other by some slimy glue like substance. In beginning, eggs are yellowish, then becomes pinkish in color (Patel, 2015; Mohamed *et al*, 2021; Abhijna *et al*, 2013).

(5) *Vespa Mandarinia* (Asian Giant Harnet)

Distribution and Habitat

Vespa mandarinia is globally found in China, Japan, China, Russia, North America, Canada, Nepal, etc. Its nesting occurs in both temperate regions as well as tropical and subtropical regions (Kaud and Sharma, 2017).

Description

Vespa mandarinia, also known as Asian giant hornet, is reported as the largest hornet. The head is broad and light brown in color, eyes are 3 in number. The head, thorax and abdomen have varying densities of setae (hairs). Wings are greyish white in color and enlarged. Forelegs are bigger than hind legs. The abdomen have 6 yellow coloured segments. They are very poisonous in nature and have a smooth nearly 1 centimeter long stinger (Branco and Cardoso, 2020; Montgomery *et al*, 2020).

Life Cycle and Habitat

Vespa mandarinia colonies have 5 larval stages. After the larval stage, the pupa grows and stays inside the cover shell up to around 17/18 days. The males grow faster than females and come out during October and wait for newly growing queen at the entrance of the nest. Mating occurs during fall. Colonies are basically grown during summer. The queen mates with only the best male and before starting of new colonies waits for 7 months. The queen feeds on tree saps. After selection of proper space for combing near tree holes, construction of honey comb starts (Salles *et al*, 2014). The combs are mostly horizontal in shape. Within this phase, workers grow. The queen feeds on her broods and when workers emerge out, they take over the duties of the queen and the queen concentrates on laying her eggs in her newly constructed nest (Sruthi and Roopavathy, 2021; Abhijna *et al*, 2013).

(6) *Rhyparochromus Vulgaris* (Seed Bug)

Distribution

It is found in Europe, Africa, North America, Southern Asia.

Description

The word *Rhyparochromus* is derived from Greek word meaning 'dirt coloured'. It is small, approximately 6-8mm long, black and yellow coloured bug. body possesses many black punctures, scutellum is black with white punctured borders. The membrane is black with a single white dot (Abhijna *et al*, 2013). Females have been found to lay eggs during the onset of April, hatching and arrival of new ones occur during July.

Habitat

It has the tendency to enter human habitats for shelter. Found in open bushy areas, mixed forests, woods, agricultural lands, gardens, weedy grounds, etc. (Montgomery *et al*, 2020). They are diurnal, found under the tree barks, logs, etc. They remain undercover during winter and dry seasons.

Feeding Habit

Eats nymphs, seeds, different types of plants like nettles, strawberry, etc.

(7) *Leptocorisa oratorius* (Rice ear Bug)**Distribution**

Found abundantly in U.S., California, Bangladesh, Burma, India, Malaysia, China, Fiji, Thailand, Samoa, etc.

Description

Leptocorisa oratorius is by far the most dominant species which is found related with paddy fields. It is basically a rice ear bug. They are sometimes confused with *Leptocorisa acuta*. The body length is approximately 2-2.5cm, with long legs and an elongated proboscis. It is slightly yellowish or brown in colour. If they are disturbed they produces an offensive unpleasant smell in defense. (Lundquist and Zhu, 2018). Eggs are laid on the rice plant in huge numbers. Eggs hatch into green nymphs, which later turns brown when becoming adult. The nymphs and adults are found to spoil the seeds by sucking out their content.

Habitat

Rice and grass plants are their major habitats and hosts as well. It also resides in beans, guava, mango, millet, etc. (Salles *et al*, 2014).

Feeding Habit

Feeds mostly on rice plants, especially developing rice ears declining crop quality.

(8) *Oncocephalus* (Assassin Bug)

Oncocephalus is a genus of assassin bug under the family Reduviidae. There are at least 210 described species of *Oncocephalus*.

Life Cycle

Female bugs usually lay their eggs in clusters. During our investigation, assassin bugs have been found to undergo incomplete metamorphosis with 3 stages of life cycle including- egg, nymph and adult. The nymphs hatch from the eggs and molt many times to reach adulthood in about 2 months (Patel, 2015).

Structure

They view through ocelli and compound eye. Their developmental mode is Hemimetabolous. The adults are diurnal.

5. CONCLUSION

As a whole 8 species of insects were spotted during our short term initiative with limited resources. The potentiality of insect varieties identified in the present study indicated that Silapathar is undoubtedly an adobe of good variety of insects just as in the other parts of Assam. Hence, one can imagine if the survey is planned in a bigger dimension with unlimited laboratory facilities then remarkable results will come out with many new species of insects and interesting facts about their physiology, livelihood and life cycle. We expect our outcomes will motivate other researchers to initiate investigations in Silapathar, Dhemaji, Assam as Assam has always been the treasury of uncountable varieties of flora and fauna.

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